

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
9 October 2003 (09.10.2003)

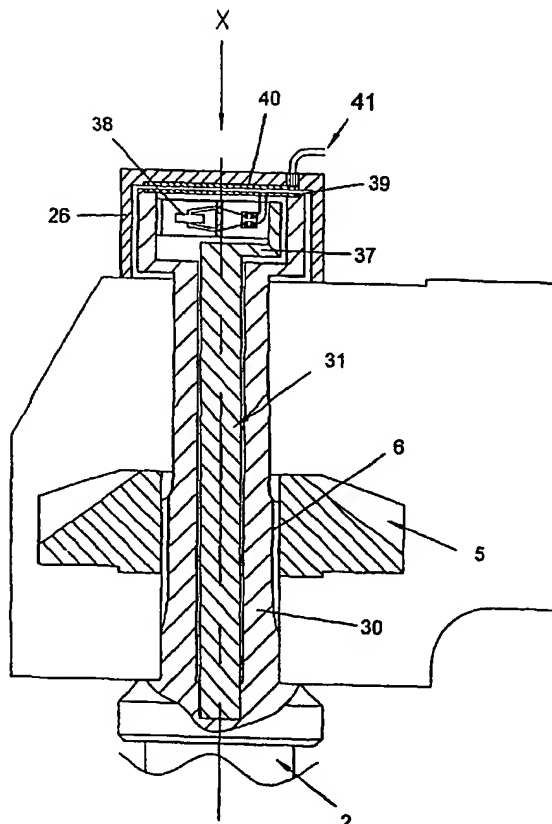
PCT

(10) International Publication Number
WO 03/082527 A1

- (51) International Patent Classification⁷: **B25B 23/14**
- (21) International Application Number: PCT/GB03/01330
- (22) International Filing Date: 27 March 2003 (27.03.2003)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
0207514.1 2 April 2002 (02.04.2002) GB
- (71) Applicant (for all designated States except US): **CRANE ELECTRONICS LTD** [GB/GB]; Watling Drive, Sketchley Meadows, Hinckley, Leicestershire LE10 3EY (GB).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): **CRANE, Ogilvie, David** [GB/GB]; Ivy House Farm, Little Lane, Leire, Lutterworth, Leicestershire LE17 5HH (GB).
- (74) Agent: **MARSHALL, John, Grahame**; Serjeants, 25 The Crescent, King Street, Leicester LE1 6RX (GB).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: TORQUE SENSING TOOL



(57) Abstract: A torque applying tool such as a nutrunner or torque wrench incorporates torque sensors responsive to strain in a shaft (30) mounting an output square drive head (2) the strain being measured as it exists immediately adjacent the drive head (2). The shaft (30) is a hollow quill shaft an outer diameter of which is splined (6) to receive a torque wrench input at a location axially spaced from the drive head (2). A central shaft (31) extends from the drive head (2) centrally up the quill shaft (30) and a flexible cantilever beam (34) is mounted between a cranked end (37) of the central shaft (31) as it extends out of the quill shaft (2) and the corresponding end of the quill shaft (2). One or more strain sensing transducers (38), preferably S.A.W. devices, are mounted on the cantilever beam (34) to detect flexure of the beam (34), and the resulting output signal is passed through an inductive or capacitive coupling (39,40) for transmission to a CPU (27) and display (28).

WO 03/082527 A1

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/01330

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B25B23/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B25B G01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 91 00989 A (BOSCH GMBH ROBERT) 24 January 1991 (1991-01-24) page 3, paragraph 2; figure 1 ---	1,7-9
A	US 4 757 721 A (CRANE DAVID O ET AL) 19 July 1988 (1988-07-19) the whole document ---	3
A	WO 01 67058 A (MAGORI VALENTIN ; SIEMENS AG (DE); WOLFF ULRICH (DE)) 13 September 2001 (2001-09-13) the whole document ---	5
A	WO 01 33180 A (LONSDALE BRYAN ; LONSDALE ANTHONY (GB); TRANSENSE TECHNOLOGIES PLC) 10 May 2001 (2001-05-10) the whole document ---	5
-/--		

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

X document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Y document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

Δ document member of the same patent family

Date of the actual completion of the international search

4 July 2003

Date of mailing of the international search report

11/07/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Carmichael, Guy

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 03/01330

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 37 14 150 A (STABIL ELEKTRONIK GMBH) 17 November 1988 (1988-11-17) ----	
A	US 4 686 859 A (WALLACE PAUL) 18 August 1987 (1987-08-18) ----	
A	DE 25 55 982 A (KESSLER KARL H ING GRAD) 16 June 1977 (1977-06-16) -----	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 03/01330

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9100989	A	24-01-1991	DE 3922860 A1 WO 9100989 A1 EP 0482014 A1 JP 4506863 T	17-01-1991 24-01-1991 29-04-1992 26-11-1992
US 4757721	A	19-07-1988	DE 3688065 D1 DE 3688065 T2 EP 0232606 A2 JP 62152683 A	22-04-1993 24-06-1993 19-08-1987 07-07-1987
WO 0167058	A	13-09-2001	DE 10054198 A1 WO 0167058 A1	13-09-2001 13-09-2001
WO 0133180	A	10-05-2001	GB 2358927 A AU 1154401 A BR 0007261 A CA 2356484 A1 CN 1340154 T EP 1144972 A1 WO 0133180 A1 JP 2003513266 T	08-08-2001 14-05-2001 29-01-2002 10-05-2001 13-03-2002 17-10-2001 10-05-2001 08-04-2003
DE 3714150	A	17-11-1988	DE 3714150 A1	17-11-1988
US 4686859	A	18-08-1987	US 4676109 A DE 182185 T1 EP 0182185 A2 JP 61181932 A	30-06-1987 25-09-1986 28-05-1986 14-08-1986
DE 2555982	A	16-06-1977	DE 2555982 A1	16-06-1977